ILRS SLR Mission Support Request Form

GENERAL INFORMATION

Satellite name :
MICROSCOPE (MICRO Satellite with drag Control for the Observation of the Equivalence Principle)

Satellite Host Organization :
CNES

Primary Technical Contact :
Jean-Bernard DUBOIS (Microscope project manager)

Mailing Address :

Telephone Number :
(33) 5 61 27 41 91

Fax Number :
(33) 5 61 27 42 28

E-mail Address :
jean-bernard.dubois@cnes.fr

Web Address :

Alternate Technical Contact :
Huguette CONESSA (Microscope Engineering Manager)

Mailing Address :

Telephone Number :
(33) 5 61 27 32 19

Fax Number :
(33) 5 61 27 42 28

E-mail Address :
huguette.conessa@cnes.fr

Web Address :

Primary Science Contact :
Gilles METRIS (Microscope mission Co-Investigator)

Mailing Address :

Telephone Number :
(33) 4 93 40 53 56

Fax Number :

E-mail Address :
gilles.metris@obs-azur.fr

Web Address :

Alternate Science Contact :
Philippe BERIO

Mailing Address :

Telephone Number :
(33) 4 93 40 53 56

Fax Number :

E-mail Address :

philippe.berio@obs-azur.fr

Web Address :

MISSION SPECIFICS

Scientific or Engineering Objectives of mission :

1) Microscope mission objectives :

The primary scientific objective of the mission is the test of the Equivalence Principle (EP) with an accuracy of 10-15.

The satellite payload is composed of two quasi identical differential micro-accelerometers including two cylindrical and concentric test masses. The masses are made of the same material for the first one which is dedicated to assess the accuracy of the EP experimentation. The mass materials are different for the second one. The attitude as well as the atmospheric and the thermal drag of the satellite are actively controlled in such a way that the satellite follows the two test masses in their gravitational motion, thanks to the specific drag compensation and attitude control system.

This drag free system demonstration using FEEP (Field Effect Electrical Propulsion) is the secondary technological mission objective of the MICROSCOPE mission.

2) Geodesic objectives

After the CHAMP, GRACE and GOCE gravity missions, the Microscope satellite will be the forth one in this decade to board micro-accelerometers which quantify surface forces. Because of this device Microscope presents a certain interest in geodesy as well. It can be considered on one hand as very adequate and independent test for checking gravity modelling by orbit computation method, provided that one gets a precise orbit.

On the other hand it will give access to thermospheric densities at his altitude through experienced drag forces. Of course, when the drag free system is on, it is necessary to know as well the quantification of Feep thrusting in order to get the full amplitude of all forces.

Hence each one of these missions boarding accelerometers gives us precise and dense information on the density of the thermosphere at their respective altitude. While GOCE will inform us about nitrogen and oxygen under 300 km altitude and CHAMP/GRACE give mainly information about oxygen, Microscope will get access to helium because it orbits at higher altitude.

In any case SLR tracking will give the only opportunity to get a precise orbit necessary for these studies.

Satellite Laser Ranging (SLR) Role of Mission :

1) Microscope scientific objectives (Equivalence Principle) :

The main requirements are:

- The accuracy of the satellite position knowledge, which must be less than ten meter.
- The accuracy of accelerometer biases knowledge, which must be better than 2 10-8 m/sec2

These performances, essential for the data post-treatments, can't be reached with only one-way range rate measurements, which are the only measurements available with this satellite. Moreover, to be able to establish precise error budgets, the mission needs to have a good confidence of the actual accuracy reached on the satellite position computation.

Laser measurements with retro-reflector is the best Alternative solution, because of its accuracy, and because of its total passivity which assure no disturbance on the satellite and consequently on the scientific objective of 10-15.

2) drag-free system demonstration objective

The accuracy of the accelerometers bias evaluation will be improved with the performance of satellite position restitution, and will allow a global optimization of the drag-free system performances.

Anticipated Launch Date :
march 2009
Expected Mission Duration :
Two years

ANTICIPATED ORBITAL PARAMETERS
Altitude :
~ 730 Km
Inclination :
~ 98.2°
Eccentricity :
~ 0.0012°

TRACKING REQUIREMENTS
tracking Schedule :
for the whole scientific mission duration
spatial coverage :
?
temporal coverage :
?
Data accuracy :
?

OPERATIONS REQUIREMENTS
Mission Coordinator (ILRS, Subnetwork, etc…) :
Huguette CONESSA.
Priority of SLR for POD :

Source of Acquisition Data :

Other Sources of POD :
one-way Doppler data

Primary Analysis Center :
CNES
Normal Point Time Span (sec) :
To be defined

Subnetworks/Stations requested to track :
To be defined

Data delivery Time requirements :
To be defined

RETROREFLECTOR ARRAY INFORMATION
Description of Array and Location
1 retro-reflector on each of the 6 sides of the satellite
Technical Contact for array Correction/Center of Mass
Yves ANDRE (MICROSCOPE Satellite manager)
Phone Number
(33) 5 61 27 36 53

E-mail Address
yves.andre@cnes.fr
Other comments